

TEST REPORT

No. AE18-0021802-02

EMISSION AND IMMUNITY TESTS

performed in accordance with

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

PRODUCT	USB power supply
MODEL TESTED	USB 2.4 A
TRADE MARK	4 BOX
APPLICANT	4 BOX S.r.l. – V.le Pasubio 6A – I-20154 Milano

Tested by	Renato Foschi <i>[Laboratory Technician]</i>	
Approved by	Giovanni Di Turi <i>[Laboratory manager]</i>	

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2014-03-14	First edition Digital signed_AE18-0021802-02_TR_EN 61000-3-2 2014 EN 61000-3-3 2013_4 BOX_USB PS_USB 2.4 A

The results of tests and checks reported in this Test Report refer exclusively to the samples tested and described in the Report itself.
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The authenticity of this Test Report and its contents can be verified by contacting IMQ S.p.A., responsible for this Test Report.

1. GENERAL DATA

SAMPLE		
Samples received on	2018/01/22	(Item(s) sampled and sent by applicant)
IMQ reference samples	BEM	89387
Samples tested No.	1	
Object under analysis recognition	Not carried out	
Remark:	Except where stated, characteristics of products were taken from client description and were not verified by the laboratory	
TEST LOCATION		
Testing dates	2018-02-19	
Testing laboratory	IMQ S.p.A. - Via Quintiliano, 43 – I-20138 Milano	
Testing site	Viale Lombardia, 20 – I-20021 Bollate (MI)	
ENVIRONMENTAL CONDITIONS		
Parameter	Range	
Ambient Temperature	20 ÷ 25 °C	
Relative Humidity	50 ÷ 60 %	
Atmospheric Pressure	900 ÷ 1000 mbar	
The laboratory is monitored by a continuous environmental conditions measurements system. Temperature, humidity and pressure data are recorded on a weekly basis and stored in local archive.		
REMARKS		
Throughout this report a point (comma) is used as the decimal separator. The ability or reliability of this product to perform its intended function in a particular application has not been investigated. Unless otherwise specified, warnings, installation instruction and/or user manual provided with the sample have been checked in Italian or English version only. IMQ declines any responsibility derived from missing or wrong information provided aside by the applicant.		

2. REFERENCE DOCUMENT

	DOCUMENT	DATE	TITLE
<input checked="" type="checkbox"/>	EN 61000-3-2	2014	Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
<input checked="" type="checkbox"/>	EN 61000-3-3	2013	Electromagnetic compatibility (EMC) Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

3. EQUIPMENT UNDER TEST (EUT) DETAILS

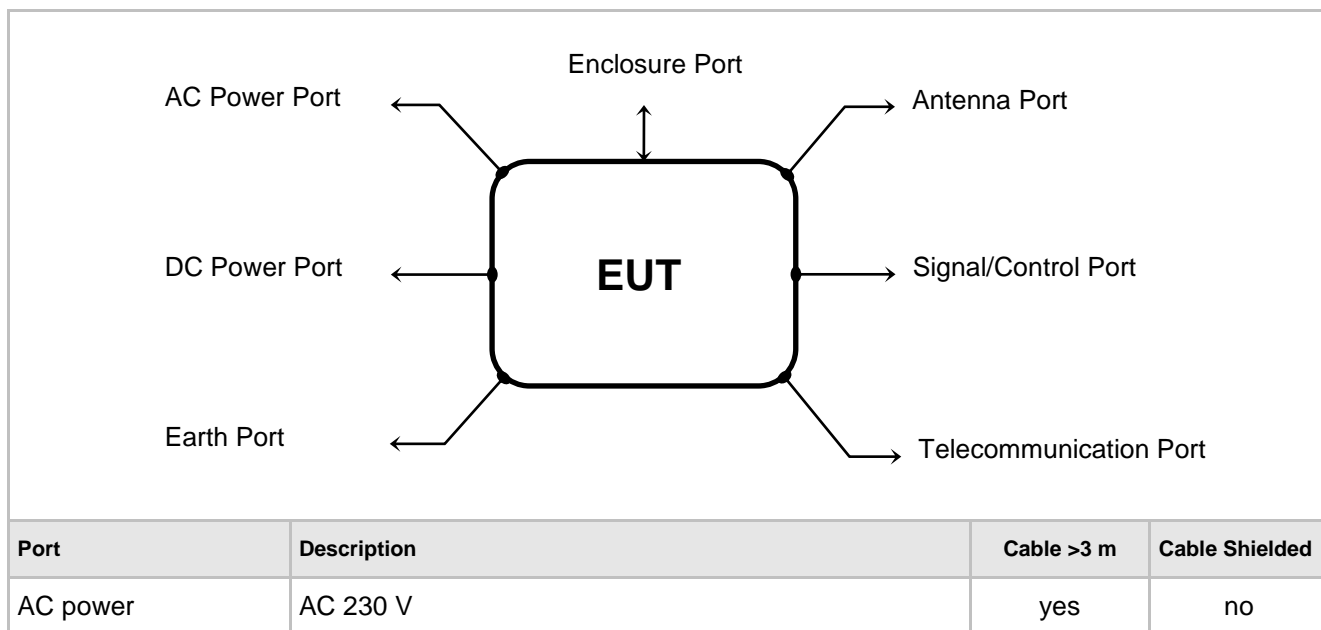
MODEL (basic)	Description
USB 2.4 A	USB power supply

MANUFACTURER	4 BOX S.r.l. – V.le Pasubio 6A – I-20154 Milano
ASSEMBLY PLANT	

EUT IDENTIFICATION

EUT type	USB power supply		
EUT classification	Multimedia equipment		
EUT use	<input checked="" type="checkbox"/> Fixed	<input type="checkbox"/> Vehicular	<input type="checkbox"/> Portable
EUT single or system	<input checked="" type="checkbox"/> Single	<input type="checkbox"/> System	
EUT standing	Wall		
Supply voltage	AC 230 V		
Frequency	50 Hz		
Power	---		
Ambient rating	---		

EUT PORTS



MODE OF OPERATION DURING THE TESTS

Ref.	Mode	Description
#1	Normal operation	USB active. Resistive load connected

SUPPORT EQUIPMENT

Defined as equipment needed for correct operation or loading of the EUT, but not considered as tested:

Equipment	Manufacturer	Model
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ELECTROMAGNETICALLY RELEVANT COMPONENTS

Component	No.	Manufacturer	Model
Electronic board	1	---	---

RFI SUPPRESSION DEVICES

Component	No.	Manufacturer	Model
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EMI PROTECTION DEVICES

Component	No.	Manufacturer	Model
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EUT TECHNICAL DOCUMENTATION

Document	Reference
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5. SUMMARY OF TEST RESULTS

POSSIBLE TEST CASE VERDICTS:	
Test object meets the requirement	PASS
Test object does not meet the requirement	FAIL
Test case does not apply to the test object	N.A.
Test not performed	N.P.

EMISSION TESTS

PORT	ENVIRONMENTAL PHENOMENON	RESULT
AC mains	Harmonic currents	PASS
	Voltage fluctuations	PASS

6. RESULTS

6.1 HARMONIC CURRENT EMISSIONS

TEST REQUIREMENT	
Reference standard	EN 61000-3-2
Test set-up	EN 61000-3-2 § 6
Test specification and procedure	EN 61000-3-2 § 6.2 and 6.2.1
IMQ operational instruction	IO-80-P12
Test supply voltage	AC 230 V
EUT operating condition	#1
Testing dates	2018-02-19

Port	Harmonic order N°	Average permissible harmonic (A)	Maximum permissible harmonic (A)	Annex	Results
Odd harmonics					
AC Mains	3°	2.30	3.45	A	PASS
	5°	1.14	1.71	A	PASS
	7°	0.77	1.155	A	PASS
	9°	0.40	0.60	A	PASS
	11°	0.33	0.495	A	PASS
	13°	0.21	0.315	A	PASS
	15°	0.15	0.199	A	PASS
	15° ≤ n ≤ 39°	0.15 · 15/n	/	A	PASS
Even harmonics					
AC Mains	2°	1.08	1.62	A	PASS
	4°	0.43	0.645	A	PASS
	6°	0.30	0.45	A	PASS
	8°	0.23	0.345	A	PASS
	8° ≤ n ≤ 40°	0.23 · 8/n	/	A	PASS

REMARKS

Detailed diagram results are shown in Annex A.

The tested sample produces values of harmonic components of the input current lower than the permitted limits for Class A equipment.

6.2 VOLTAGE CHANGES, VOLTAGE FLUCTUATIONS AND FLICKER

TEST REQUIREMENT	
Reference standard	EN 61000-3-3
Test set-up	EN 61000-3-3 § 6
Test specification and procedure	EN 61000-3-3 § 6.6
IMQ operational instruction	IO-80-P13
Test supply voltage	AC 230 V
EUT operating condition	#1 (switch On)
Testing dates	2018-02-19

Port	Type of voltage fluctuation	Limits	Annex	Results
AC Mains	Short-term flicker indicator P_{st}	1.0	B	PASS
	Long-term flicker indicator P_{lt}	0.65	B	PASS
	Relative steady-state voltage change d_c	3.3 %	B	PASS
	Relative voltage change characteristic $d_{(t)}$	>3.3 % for not more than 500 ms	B	PASS
	Maximum relative voltage change d_{max}	<input checked="" type="checkbox"/> 4% <input type="checkbox"/> 6% <input type="checkbox"/> 7%	B	PASS

REMARKS

Detailed diagram results are shown in Annex B.

7. TESTS UNCERTAINTY

Unless otherwise stated the uncertainties for the tests and measurements are evaluated in according to IMQ Operational Instruction IO-LAB-001 and IO-LAB-004.

The expanded uncertainty was calculated for all measurements and tests listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainty in EMC Measurements", with UKAS document LAB 34 and is documented in the quality system accordance to ISO/IEC 17025.

Internal Procedure PG-037 ensures that the requirements for traceability of calibrations, of all test equipment requiring calibration, and calibration intervals are met.

8. MEASUREMENT EQUIPMENT AND INSTRUMENTATION

HARMONIC CURRENT EMISSIONS VOLTAGE CHANGES, VOLTAGE FLUCTUATIONS AND FLICKER			
Instrument	Manufacturer	Model	IMQ Ref.
Harmonics & flicker analyser	BOCONSULT	B10	S-03569
Line impedance simulator	SPITZENBERGER	/	S-03572
Multimeter	FLUKE	45	S-04159
Software 2	SPITZENBERGER & SPIES	EMC TEST Vers. 2.12.a	W-00200
PC	/	/	H-00166

9. PHOTOGRAPHIC DOCUMENTATION

EUT IDENTIFICATION



10. DIAGRAMS

ANNEX A Harmonic currents emissions

Maximum RMS current and corresponding values in timewindow 2:

Voltage: 231.37 Vrms THD=0.00 % THV=0.009 V POHV=0.004 V PWHD=0.01 %
Current: 0.006 Arms THD=75.91 % THC=0.003 A POHC=0.002 A PWHD=296.43 %
Power: 1.0 W P1=1.0 W 1.4 VA
Power factor: 0.712 CosPhi1: 0.920

Test conditions EN 61000-3-2:2014, f=50 Hz, Phase=L1, Range=0.16 A

Time window=16, Grouping (>2nd harm.)=off

No Ztest selected

harmonic currents < 0.6 % of I or < 5 mA are disregard for calc. of THD, THC, POHC, PWHD

HARMONIC ANALYSIS: Test PASS

Tobs = entire measurement; POHC: avg=0.00 A, limits=0.25 A

Iavg=0.006 Arms

Ha	Entire measurement (59.808 s = 187 time window(s))							Worst 2.5 min		Average		P A S S	F A I L
	Maximum	Window	EN61000-3-2 Class A	Margin in MaxWin	100 to 150%	150 to 200%	Ex- ceeded	100 to 150%	Ex- ceeded	Value	Ex- ceeded		
DC	0.0002 A	163	-----	-----	0	0	0	n.e.	n.e.	0.0002 A	0	X	
1	0.0046 A	1	-----	-----	0	0	0	n.e.	n.e.	0.0045 A	0	X	
2	0.0003 A	77	1.0800 A	-100.0 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
3	0.0009 A	8	2.3000 A	-100.0 %	0	0	0	n.e.	n.e.	0.0009 A	0	X	
4	0.0003 A	82	0.4300 A	-99.9 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
5	0.0009 A	8	1.1400 A	-99.9 %	0	0	0	n.e.	n.e.	0.0009 A	0	X	
6	0.0002 A	82	0.3000 A	-99.9 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
7	0.0009 A	12	0.7700 A	-99.9 %	0	0	0	n.e.	n.e.	0.0009 A	0	X	
8	0.0002 A	79	0.2300 A	-99.9 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
9	0.0009 A	13	0.4000 A	-99.8 %	0	0	0	n.e.	n.e.	0.0009 A	0	X	
10	0.0002 A	81	0.1840 A	-99.9 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
11	0.0009 A	13	0.3300 A	-99.7 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
12	0.0002 A	2	0.1533 A	-99.9 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
13	0.0008 A	12	0.2100 A	-99.6 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
14	0.0002 A	2	0.1314 A	-99.8 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
15	0.0008 A	11	0.1500 A	-99.4 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
16	0.0002 A	2	0.1150 A	-99.8 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
17	0.0008 A	11	0.1324 A	-99.4 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
18	0.0002 A	2	0.1022 A	-99.8 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
19	0.0008 A	1	0.1184 A	-99.3 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
20	0.0002 A	2	0.0920 A	-99.8 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
21	0.0008 A	1	0.1071 A	-99.3 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
22	0.0002 A	2	0.0836 A	-99.8 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
23	0.0008 A	2	0.0978 A	-99.2 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
24	0.0002 A	5	0.0767 A	-99.7 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
25	0.0007 A	9	0.0900 A	-99.2 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
26	0.0002 A	5	0.0708 A	-99.7 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
27	0.0007 A	8	0.0833 A	-99.1 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
28	0.0002 A	5	0.0657 A	-99.7 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
29	0.0007 A	9	0.0776 A	-99.1 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
30	0.0002 A	81	0.0613 A	-99.7 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
31	0.0007 A	9	0.0726 A	-99.1 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
32	0.0002 A	82	0.0575 A	-99.7 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
33	0.0007 A	8	0.0682 A	-99.0 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
34	0.0002 A	82	0.0541 A	-99.7 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
35	0.0006 A	29	0.0643 A	-99.0 %	0	0	0	n.e.	n.e.	0.0006 A	0	X	
36	0.0001 A	81	0.0511 A	-99.7 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
37	0.0006 A	36	0.0608 A	-99.0 %	0	0	0	n.e.	n.e.	0.0006 A	0	X	
38	0.0001 A	82	0.0484 A	-99.7 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
39	0.0006 A	37	0.0577 A	-99.0 %	0	0	0	n.e.	n.e.	0.0006 A	0	X	
40	0.0001 A	82	0.0460 A	-99.7 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	

average value < 0.6 % of Iavg or < 5 mA n.e. = not evaluated

Tested with SPS EMC 4.1.8 / PAS5000 by Spitzenberger & Spias GmbH & Co. KG, Schriedtstr. 32-34, 94234 Viechtach, Germany, 21.02.2018

ANNEX B

Voltage changes, voltage fluctuations and flicker

Test conditions: EN 61000-3-3:2013 / 230 V / 50 Hz / Phase L1
 EN 61000-4-15:2011 / Obs 1 x 1 min / Z_{test} (0.400+j0.250) Ohm
 R_a+jX_a (0.2400+j0.1500) Ohm / R_n+jX_n (0.1600+j0.1000) Ohm

FLICKER: Test PASS!

Time	P _{max}	P _{st}	Sliding Plt	T _{max} [s]	d _{max} [%]	dc [%]	PASS	FAIL
09:53:12	0.233	0.1750	0.1750	0.000	0.010	0.020	X	
Limits:		1.000	0.650	0.500	4.000	3.300		
Plt: 0.076438 (calculated over 12 periods)								
Evaluated: PST, dc, d _{max} , T _{max}								

FLICKER: Source test PASS!

Time	P _{max}	P _{st}	Sliding Plt	T _{max} [s]	d _{max} [%]	dc [%]	PASS	FAIL
09:53:12	0.000	0.0040	- . - - -	0.000	0.000	- . - - -	X	
Plt: 0.001747 (calculated over 12 periods)								
Evaluated: PST <= 0.4 d _{max} < 20 % d _{max1}								

Tested with SPS EMC 418 / PAS5000 by Spitzenberger & Spies GmbH & Co. KG, Schmidstr. 32-34, 94234 Viechtach, Germany, 21.02.2018

11. OPINIONS AND INTERPRETATIONS - NOT OBJECT TO ACCREDIA ACCREDITATION

Not Applicable

END OF TEST REPORT